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Table 1 Formulae used for the computation of morphometric parameters

Sl. no.	Morphometric parameters	Formula/definition	References
1	Stream order (μ)	Ranking hierarchically	Strahler (1964)
2	Number of stream (Nμ)	Total number of stream segment of the order u	Strahler (1957)
3	Stream length (Lμ)	Total length of the stream segments of that particular order	Horton (1945)
4	Texture Ratio (T)	$T= N\mu/A$ Where $N\mu$= total number of stream of all order A= area of the river basin(Km^2)	Horton (1945)
5	Bifurcation ratio (Rb)	$Rb= N\mu /N(\mu+1)$ Where $N\mu$= total number of stream segments of the order 'μ' $N(\mu+1)$= number of stream segments of the next higher order	Schumn (1956)
6	Stream frequency (Fu)	$Fu =\sum N\mu/A$ Where, $\sum N\mu$ = total number of stream segments of all orders A= area of the river basin(Km^2)	Horton (1932)
7	Form factor (Rf)	$Rf =A/L^2$ Where, A=area of the basin (Km^2) L= basin length (km)	Hortan (1932)
8	Elongation ratio (Re)	$Re =D/L = 1.128\sqrt{A}/ L$ Where, D= diameter of a circle of the same area(A) as the basin A= area of the basin (Km^2) L= basin length (km)	Schumn (1956)
9	Circularity ratio (Rc)	$Rc =4\pi A/P^2$ Where, A= area of the basin (km^2) P= perimeter (km)	Miller (1953); Strahler (1964
10	Shape factor (Bs)	$Bs = L^2/A$	Horton (1932)

		Where ,*L*= basin length (km) *A*= area of the basin (km^2)	
11	Length of overland flow (Lo)	$Lo=2/Dd$ Where ,*Dd*= drainage density of basin	Horton (1945)
12	Drainage density(Dd)	$Dd=\sum L\mu/A$ Where, $\sum L\mu$= total length of the stream segments of all orders *A*= area of the river basin or grid (km^2)	Horton (1932)
13	Basin length (Lb)	$Lb= 1.312 X A^{0.568}$ Where,Lb=Length of Basin(km) A=Area of Basin (km^2)	Nookaratnam et al. (2005)
14	Compactness Constant (Cc)	$Cc=0.2821P/A^{0.5}$ Where,Cc=Compactness Constant A=Area of the basin (km^2) P=Perimeter of the basin (km)	Horton (1945)

Table.2 Analyzed morphometric parameters

Watershed number	Area (km^2)	Perimeter (km)	length (km)	N1	N	Lb (Km)	Rb	Dd	Fu	T	Lo	Rf	Bs	Re	Rc	Cc
1	39.04	32.57	17.04	2	3	10.52	2	0.44	0.08	0.06	0.22	0.35	2.83	0.67	0.46	1.47
2	329.96	171.41	139.03	14	22	35.35	2.43	0.42	0.07	0.08	0.21	0.32	3.79	0.58	0.14	2.66
3	115.27	62.86	48.17	8	11	19.59	3.15	0.42	0.10	0.13	0.21	0.30	3.33	0.62	0.37	1.65
4	149.31	97.21	52.77	9	12	22.53	3.25	0.34	0.08	0.12	0.17	0.30	3.40	0.61	0.20	2.24
5	151.03	72.10	59.37	8	11	22.68	4.5	0.35	0.07	0.15	0.20	0.29	3.41	0.61	0.36	1.65
6	187.80	90.33	69.59	11	13	25.67	6	0.37	0.07	0.12	0.19	0.29	3.51	0.60	0.29	1.86
7	592.32	278.29	244.08	33	43	49.29	3.95	0.41	0.07	0.12	0.21	0.24	4.10	0.56	0.10	3.23
8	462.66	177.89	199.67	28	40	42.83	3.204	0.43	0.09	0.16	0.22	0.25	3.97	0.57	0.18	2.33
9	144.68	68.41	59.59	10	12	22.13	5.5	0.00	0.08	0.15	0.00	0.30	3.39	0.61	0.39	1.60
10	133.77	60.56	57.33	8	11	21.17	3.25	0.43	0.08	0.13	0.21	0.30	3.35	0.62	0.46	1.48
11	296.39	110.46	136.89	21	28	33.26	4.75	0.46	0.09	0.19	0.23	0.27	3.73	0.58	0.31	1.81
12	296.86	107.51	130.42	22	30	33.29	3.55	0.44	0.10	0.20	0.22	0.27	3.73	0.58	0.32	1.76
13	147.78	65.10	65.38	12	15	14.06	4	0.44	0.23	0.18	0.22	0.75	1.34	0.98	0.44	1.51
14	168.67	71.37	63.18	11	15	24.15	3.333	0.38	0.09	0.21	0.19	0.29	3.46	0.61	0.42	1.55
15	105.92	58.54	44.90	7	9	18.54	3.5	0.43	0.08	0.12	0.21	0.31	3.27	0.63	0.39	1.60
16	90.46	61.62	65.38	5	6	16.95	5	0.72	0.07	0.10	0.36	0.31	3.18	0.63	0.30	1.83
17	232.22	114.88	77.80	14	21	28.96	2.93	0.34	0.09	0.12	0.17	0.28	3.61	0.59	0.22	2.13
18	255.55	100.11	99.71	13	16	30.58	4.25	0.39	0.06	0.16	0.20	0.27	3.66	0.59	0.32	1.77
19	95.46	60.01	15.26	3	4	17.48	2.5	0.16	0.04	0.07	0.08	0.31	3.12	0.63	0.33	1.73
20	46.33	46.30	38.70	9	13	11.60	3	0.84	0.28	0.28	0.42	0.34	2.90	0.66	0.27	1.92

Table 3 Stream order of Pahuj watersheds

Watershed no.	I Order	II Order	III Order	IV Order	V Order	Total no. Of streams
1	2				1	3
2	14	5		2	1	22
3	8	2		1		11
4	9	2		1		12
5	8	1		1		10
6	11	1		1		13
7	33	5	4	1		43
8	28	9	2	1		40
9	10	1	1			12
10	9	2	1			11
11	21	6		1		28
12	22	6	1	1		30
13	12	2	1			15
14	11	3	1			15
15	7	2				9
16	5	1				6
17	14	5	1		1	21
18	13	2		1		16
19	9	2	1		1	4
20	3	1				13

Watershed number	Rb	Dd	Fu	T	Lo	Rf	Bs	Re	Rc	Cc	Compound Factor	Prioritized Rank
1	20	6	13	20	6	19	2	19	20	1	12.6	18
2	18	10	17	18	10	17	18	3	2	19	13.2	19
3	15	11	4	11	11	13	6	14	14	7	10.6	10
4	12	17	12	12	17	10	10	11	4	18	12.3	17
5	5	16	15	8	13	9	11	10	13	8	10.8	12
6	1	15	16	14	16	7	13	8	7	14	11.1	14
7	8	12	14	16	12	1	20	1	1	20	10.5	9
8	14	8	8	7	7	2	19	2	3	17	8.7	5
9	2	20	10	9	20	11	9	12	16	5	11.4	15
10	13	7	11	10	8	12	8	13	19	2	10.3	8
11	4	3	5	4	3	4	16	5	9	12	6.5	1
12	9	5	3	3	4	3	17	4	11	11	7	2
13	7	4	2	5	5	20	1	20	18	3	8.5	4
14	11	14	7	2	15	8	12	9	17	4	9.9	6
15	10	9	9	15	9	14	7	15	15	6	10.9	13
16	3	2	18	17	2	16	5	17	8	13	10.1	7
17	17	18	6	13	18	6	14	7	5	16	12	16
18	6	13	19	6	14	5	15	6	10	10	10.4	11
19	19	19	20	19	19	15	4	16	12	9	15.2	20
20	16	1	1	1	1	18	3	18	6	15	8	3

Table 4 Calculation of compound factor and prioritized ranks

Table 5 Pair comparison matrix of features

	Compound Factor	Slope	Drainage density	Soil type	Field Capacity	Rainfall	Normalised weight
Compound Factor	1	2	4	5	7	9	41.9
Slope	1/2	1	2	4	5	7	25.7
Drainage density	1/4	1/2	1	2	4	5	15.0
Soil type	1/5	1/4	1/2	1	2	4	8.9
Field Capacity	1/7	1/5	1/4	1/2	1	2	5.2
Rainfall	1/9	1/7	1/5	1/4	1/2	1	3.2
CR	0.0306						